## **Amendment to the Claims**

- 1. (currently amended) An apparatus for seismic data acquisition comprising:
  - a) a sensor unit for sensing seismic energy, the sensor unit providing a signal indicative of seismic energy sensed by the sensor unit;
  - b) an acquisition device co-located with the sensor unit and coupled thereto for receiving the signal;
  - c) a memory unit having a first memory disposed in the acquisition device for storing <u>in digital form</u> information indicative of the received signal;
  - d) a second memory for storing a location parameter associated with the sensor unit; and
  - e) a communication device for providing direct <u>bi-directional</u> communication between the acquisition device and a remotely-located central controller.
- 2. (original) An apparatus according to claim 1, wherein the sensor unit and the acquisition device are housed in a common housing.
- 3. (original) An apparatus according to claim 1, wherein the sensor unit and the acquisition device are coupled together with a cable.
- 4. (original) An apparatus according to claim 1, wherein the sensor unit includes one of a velocity sensor and a pressure sensor.
- 5. (original) An apparatus according to claim 1, wherein the sensor unit includes an accelerometer.
- 6. (original) An apparatus according to claim **1**, wherein the sensor unit further comprises a multi-component sensor.

- 7. (original) An apparatus according to claim 1, wherein the sensor unit further comprises a multi-component accelerometer having a digital output signal.
- 8. (original) An apparatus according to claim 1 further comprising an analog-to-digital converter disposed in the sensor unit, the signal provided by the sensor unit including a digital signal.
- 9. (original) An apparatus according to claim 1, wherein the signal is an analog signal, the apparatus further comprising an analog-to-digital converter disposed in the acquisition device for converting the signal to digital data.
- 10. (original) An apparatus according to claim 1, wherein the first memory further comprises a nonvolatile memory.
- 11. (original) An apparatus according to claim 1, wherein the first memory further comprises a removable memory.
- 12. (original) An apparatus according to claim 1, wherein the first memory further comprises one or more of a miniature hard disk drive and a nonvolatile removable memory card.
- 13. (original) An apparatus according to claim 1, wherein the memory unit includes an inductive coupling device for transferring the information stored in the memory unit to an external device.
- 14. (original) An apparatus according to claim 1, wherein the memory unit includes an optical coupling device for transferring the information stored in the memory unit to an external device.

- 15. (original) An apparatus according to claim 1, wherein the sensor unit is coupled to the acquisition device using a sensor connector, the memory unit also being coupled to the sensor connector for enabling retrieval of the information stored in the memory unit using the sensor connector.
- 16. (original) An apparatus according to claim 1, wherein communication with the remotely-located central controller provides wireless command and control for the apparatus.
- 17. (original) An apparatus according to claim 1 further comprising a processor associated with the acquisition unit and the communication device, the processor processing programmed instructions enabling a software-defined radio transceiver.
- 18. (original) An apparatus according to claim 1, wherein the communication device includes a direct conversion radio transceiver for wireless communication between the apparatus and the remotely-located central controller.
- 19. (original) An apparatus according to claim 1 further comprising a processor in the acquisition unit for providing one or more of local control, time keeping, and power management.
- 20. (original) An apparatus according to claim 1 further comprising a power source disposed in the acquisition device for providing electrical power to one or more of the acquisition device, the sensor unit and the communication device.
- 21. (original) An apparatus according to claim **20**, wherein the power source is removable.
- 22. (original) An apparatus according to claim **20**, wherein the power source includes a rechargeable battery.

- 23. (original) An apparatus according to claim **22** further comprising an inductive coupling in the acquisition device, the inductive coupling being operably coupled to the rechargeable battery to allow charging of the rechargeable battery by a second power source external to the acquisition device.
- 24. (original) An apparatus according to claim **22** further comprising a connector disposed in the data acquisition device, the connector being operably coupled to the rechargeable battery to allow charging of the rechargeable battery by a second power source external to the acquisition device.
- 25. (original) An apparatus according to claim **22**, wherein the rechargeable battery comprises one or more of a nickel-metal hydride battery, a lithium-ion battery, and a lithium-polymer battery.
- 26. (original) An apparatus according to claim 1, further comprising a GPS receiver associated with the sensor unit for determining the location parameter.
- 27. (currently amended) A method for for seismic data acquisition comprising:
  - a) sensing seismic energy in the earth using a sensor unit coupled to the earth;
  - b) sending a signal indicative of the sensed seismic energy from the sensor unit to an acquisition device co-located with the sensor unit;
  - c) storing information indicative of the signal in digital form in a first memory disposed in the acquisition device;
  - d) storing a location parameter in a second memory; and
  - e) directly communicating with a remotely-located central controller using a <u>bi-directional</u> communication device co-located with the sensor unit and the acquisition device.
- 28. (original) A method according to claim **27**, wherein the sensor unit is selected from one of a velocity sensor and a pressure sensor.

- 29. (original) A method according to claim **27**, wherein the sensor unit includes an accelerometer and signal is indicative of a sensed acceleration of the seismic energy.
- 30. (currently amended) A method according to claim **27**, wherein the sensor unit further comprises a multi-component sensor and the signal in is indicative of movement in at least two directions.
- 31. (original) A method according to claim **27**, wherein sending the signal includes sending a digital signal from the sensor unit.
- 32. (original) A method according to claim **27**, wherein sending the signal includes sending an analog signal from the sensor unit, the method further comprising digitizing the analog signal in the acquisition device.
- 33. (original) A method according to claim **27**, wherein storing information in the memory unit includes storing the information in a non-volatile memory.
- 34. (currently amended) A method according to claim **27**, wherein the memory unit further comprises a removable memory, the method further comprising removing the removable a full memory unit from the acquisition device after the information is stored therein to allow replacement of the full removable memory unit with an empty a fresh removable memory unit.
- 35. (original) A method according to claim **27**, wherein the memory unit includes an inductive coupling device, the method further comprising transferring the information stored in the memory unit to an external device using the inductive coupling device.
- 36. (original) A method according to claim **27**, wherein the memory unit includes an optical coupling device, the method further comprising transferring the information stored in the memory unit to an external device using the optical coupling device.

- 37. (original) A method according to claim **27**, wherein the sensor unit is coupled to the acquisition device using a sensor connector, the memory unit also being coupled to the sensor connector, the method further comprising retrieving the information stored in the memory unit using the sensor connector.
- 38. (original) A method according to claim 27, wherein communicating with the remotely-located unit includes wireless communication of command and control signals for the acquisition device.
- 39. (original) A method according to claim **27** further comprising providing one or more of local control, time keeping, and power management using a processor disposed in the acquisition unit.
- 40. (original) A method according to claim **27** further comprising providing power to one or more of the acquisition device, the sensor unit and the communication device using a power source disposed in the acquisition device.
- 41. (original) A method according to claim **40**, wherein the power source includes a rechargeable battery, the method further comprising recharging the rechargeable battery using a second power source external to the acquisition device and coupled to the acquisition device using one of a connector and an inductive coupling.
- 42. (original) A method according to claim **27** further comprising providing a time keeping function using a clock circuit and processor disposed in the acquisition device.
- 43. (original) A method according to claim **42**, wherein a seismic data acquisition session is initiated by the time keeping circuit.

- 44. (original) A method according to claim **27** further comprising providing synchronization information to the acquisition device for time keeping from the remotely-located central controller.
- 45. (original) A method according to claim **27** further comprising initiating a seismic data acquisition session from the remotely-located central controller.
- 46. (original) A method according to claim **27** further comprising sending recording status information from the acquisition device to the remotely-located central controller in real time over a wireless communication link.
- 47. (original) A method according to claim **27** further comprising sending the information from the acquisition device to the remotely-located central controller in real time over a wireless communication link.
- 48. (original) An apparatus for detecting unwanted movement of a remotely-located seismic data acquisition device, comprising:
  - a) a sensor disposed in the seismic data acquisition device for detecting movement, the sensor providing a first signal indicative of the movement;
  - b) a processor coupled to the sensor for processing the first signal, the processor providing a second signal indicative of unwanted movement of the data acquisition device;
  - c) a communication device located with the sensor and the acquisition device to transmit the second signal to a central controller.
- 49. (original) An apparatus according to claim **48**, wherein the communication device is a wireless communication device.

- 50. (original) An apparatus according to claim **48**, wherein the sensor is acoustically coupled to the earth to sense seismic energy in the earth, the second signal being further indicative of seismic energy in the earth.
- 51. (original) An apparatus according to claim **48** further comprising a second sensor acoustically coupled to the earth to sense seismic energy in the earth, the second sensor providing a third signal indicative of the sensed seismic energy.
- 52. (original) An apparatus according to claim **51**, wherein the first signal and third signal are combined and the second signal includes the combined first signal and third signal.
- 53. (original) An apparatus according to claim **48**, wherein the sensor includes an accelerometer.
- 54. (original) An apparatus according to claim **48**, wherein the sensor includes a multi-axis accelerometer.
- 55. (original) A method for detecting unwanted movement of a remotely-located seismic data acquisition device, comprising:
  - a) detecting movement using a sensor disposed in the seismic data acquisition device, the sensor providing a first signal indicative of the movement;
  - b) processing the first signal using a processor coupled to the sensor, the processor providing a second signal indicative of unwanted movement of the data acquisition device;
  - c) transmitting the second signal to a remotely-located central controller using a communication device co-located with the sensor and the acquisition device.
- 56. (original) A method according to claim **55**, wherein transmitting the second signal includes transmitting the second signal using a wireless communication link.

- 57. (original) A method according to claim **55** further comprising sensing seismic energy in the earth using the sensor, the second signal being further indicative of seismic energy in the earth.
- 58. (original) A method according to claim **55** further comprising sensing seismic energy in the earth using a second sensor, the second sensor providing a third signal indicative of the sensed seismic energy.
- 59. (original) A method according to claim **58** further comprising combining the first signal and third signal, the second signal including the combined first signal and third signal.
- 60. (original) A method according to claim **55**, wherein detecting movement includes sensing acceleration with an accelerometer having one or more axes of sensitivity.
- 61. (currently amended) A system for seismic surveying, comprising:
  - a) a central controller;
  - b) a sensor unit remotely located from the central controller, the sensor unit coupled to the earth for sensing seismic energy in the earth and for providing a signal indicative of the sensed seismic energy;
  - c) a recorder device co-located with the sensor unit and coupled thereto for receiving the signal and for storing <u>in digital form</u> information indicative of the received signal in a first memory disposed in the recorder device;
  - d) a second memory for storing a location parameter associated with the sensor unit; and
  - e) a communication device co-located with the sensor unit and the recorder device for providing direct <u>bi-directional</u> communication with the central controller.
- 62. (original) A system according to claim **61** further comprising an energy source for providing the seismic energy in the earth.

- 63. (original) A system according to claim **61**, wherein the communication device includes a two-way wireless transceiver for wireless communication with the central controller.
- 64. (currently amended) An apparatus for seismic data acquisition comprising:
  - a) a sensor unit coupled to the earth for sensing seismic energy in the earth, the sensor unit providing a signal indicative of the sensed seismic energy; and
  - b) a wireless seismic recorder co-located with the sensor unit and coupled thereto for receiving the signal, the wireless seismic recorder including,
    - a memory unit for storing <u>in digital form</u> information indicative of the received signal and a wireless communication device for providing direct <u>bi-directional</u> wireless communication with a remotely-located central controller; and
  - c) a second memory for storing a location parameter associated with the sensor unit.
- 65. (original) A method for seismic data acquisition comprising:
  - a) transporting a seismic sensor unit to a seismic survey location;
  - b) deploying the seismic sensor unit;
  - c) determining one or more location parameters for the sensor unit;
  - d) updating one or more system parameters based at least in part on the determined location parameters; and
  - e) sensing seismic energy using the seismic sensor.
- 66. (original) A method according to claim **65**, wherein updating the one or more system parameters includes entering a system parameter at the sensor unit location.
- 67. (original) A method according to claim **65**, wherein updating one or more system parameters includes a system parameter at a central controller.

- 68. (original) A method according to claim **65**, wherein updating one or more system parameters includes automatically entering a system parameter using one or more devices in the sensor unit to determine the location parameters upon activation of the sensor unit.
- 69. (currently amended) A system for seismic data acquisition comprising:
  - a) a central controller;
  - b) a plurality of sensors disposed to form a seismic spread having a plurality of sensing locations;
  - c) a plurality recorders, each of the plurality of recorders recording seismic information corresponding to a selected sensing location from the plurality of sensing locations, each of the plurality of recorders being in direct <u>bi-directional</u> communication with the central controller.
- 70. (currently amended) An apparatus for seismic data acquisition comprising:
  - a) a plurality of sensors disposed to form a seismic spread having a plurality of sensing locations; and
  - b) a plurality recorders, each of the plurality of recorders recording <u>in digital form</u> seismic information corresponding to a selected sensing location from the plurality of sensing locations.
- 71. (original) An apparatus for seismic data acquisition comprising:
  - a) a sensor unit for sensing seismic energy, the sensor unit providing a signal indicative of the sensed seismic energy;
  - b) an acquisition device co-located with the sensor unit and coupled thereto for receiving the signal;
  - c) a memory unit disposed in the acquisition device for storing information indicative of the received signal; and
  - d) a direct-conversion radio transceiver for providing communication between the acquisition device and a remotely-located central controller.